

REMARKS

Claims 37-51 are pending in this application. By this Amendment, claim 37 is amended to further distinguish from Mian. Claims 37, 42, 44 and 50 are amended to overcome the 35 U.S.C. §112, first and/or second paragraph rejections. Support for the amendment to claim 50 can be found in the original specification at least at, for example, page 24, lines 7-8. Claim 51 is newly added. Support for new claim 51 can be found in the original specification at least at, for example, page 12, lines 21-25, page 13, line 30 to page 14, line 5, page 16, lines 11-14 and page 18, lines 20-32. No new matter is added.

In view of the foregoing amendments and the following remarks, reconsideration and allowance of claims 37-51 are respectfully requested.

Objection To The Drawings

The Drawings were objected to for allegedly not showing each isolating chamber being in an open position and a closed position, as recited in claim 41. Applicants respectfully traverse this objection.

Fig. 2, for example, shows isolating means 201 and 202 in an open position. See, for example, page 12, lines 6-8 and Fig. 2 of the specification. Further, Fig. 3 shows the isolating means 201 and 202 in a closed position. See page 13, lines 26-28 and Fig. 3 of the specification.

Thus, at least Figs. 2 and 3 show an example of each isolating chamber being in an open position and a closed position, as recited in claim 41.

Withdrawal of the objection is respectfully requested.

35 U.S.C. §112 Rejections

First Paragraph

Claims 41 and 50 were rejected under 35 U.S.C. §112, first paragraph, as allegedly lacking written description. Applicants respectfully traverse this rejection.

Regarding claim 41, the Patent Office alleges that the specification lacks written description for the feature of claim 41 reciting "each isolating chamber is capable of being in an open position that establishes communication between the respective one of the inlet duct and the outlet duct with an outside, and a closed position that isolates the respective one of the inlet duct and the outlet duct from the outside."

As discussed above, Figs. 2 and 3 clearly illustrate the open and closed position of the isolating chambers. The specification further describes that when the isolating chambers are in an open position, it is possible to fill the device, for example "naturally with ambient air, under atmospheric pressure, or under a higher pressure, according to the inlet and outlet pressures of the device." See page 12, lines 6-8 and page 13, lines 26-28 of the specification. Thus, claim 41 has written description support in the specification.

Regarding claim 50, the Patent Office alleges that the term "a magnet" lacks written description. The Patent Office alleges that this supports only "magnetically actuated micro valves." Applicants respectfully disagree.

Claim 50 is amended to recite "wherein the particle retaining device is a magnetic particle retaining means." The specification recites "a means 308 for retaining particles, for example of the magnetic type." Claim 50 has written description support in the specification.

Further, a person skilled in the art would recognize that the specification supports "a magnet." The MPEP states "there is a strong presumption that adequate written description of the claimed invention is present in the specification as filed." See MPEP §2163 II. A.

A means of the magnetic type for retaining particles would be understood by one of ordinary skill in the art to encompass a magnet, as a magnet is the most basic of means to retain magnetic particles. Further, the Patent Office provides no explanation why

"magnetically actuated micro valves" are supported, but "a magnet" itself is not. Clearly, any such "magnetic actuation" of a micro valve would require a magnet for operation.

For at least the above reasons, withdrawal of the rejection is respectfully requested.

Second Paragraph

Claims 37-50 were rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. Applicants respectfully traverse this rejection.

Claim 37

The Patent Office alleges that the term "the liquid" recited in claim 37 lacks antecedent basis. Claim 37 is amended to recite "a liquid" for antecedence.

The Patent Office further alleges that "it is unclear how the control of the temperature and pressure can be accomplished in the absence of any sensor...". The Patent Office alleges that such "sensors" are "essential elements" and must be recited in the claim. Applicants respectfully disagree.

The Patent Office's allegation that the "sensors" are an essential element of the claim is unfounded. MPEP §2172.01 recites: "a claim which fails to interrelate essential elements of the invention as defined by applicant(s) in the specification may be rejected" (emphasis added). In this regard, the present specification does not indicate that such sensors are an essential element of the claims.

Further, claim 37 does not preclude the inclusion of sensors to the microfluidic device, although such sensors are not presently recited in the claim. Claim 37 does not require any "logic device" or "controller", as indicated by the Patent Office.

Thus, because the specification does not define the sensors as essential or necessary to interrelate the elements of the claim, the Patent Office's indefiniteness allegation is unfounded.

Claim 39

The Patent Office alleges that "it is not clear...what structural features of the capillary valves would provide for generating the 'overpressure at a meniscus between the gas and the liquid...". Applicants respectfully disagree.

The MPEP requires that definiteness of a claim must be analyzed in light of (A) the content of the particular application disclosure, (B) the teachings of the prior art and (C) the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. See MPEP §2173.02.

The specification recites, for example: "[i]n accordance with US-C-4 676 274, a microfluidic device is described, consisting of an arrangement of capillary ducts comprising various capillary valves, with no moving parts, each constructed so as to generate an overpressure at the interface between a control gas and a liquid of interest, or meniscus." See page 3, lines 22-32 of the specification. The specification further recites "As shown by way of example in Figure 1, but also in the enlargement of Figure 3, it is the relative geometry of the edges or walls that is selected in order to generate any capillary valve as defined above functionally." See page 10, lines 12-16 of the specification. In other words, for example, the structural features of the capillary valves that allow for the possibility of generating the overpressure at a meniscus are the relative geometries of the edges or walls of the capillary valves.

In view of the above content of the specification, the disclosure of U.S. Patent No. 4,676,274, claim 39 is definite.

Claim 40

The Patent Office alleges that "a cross section of the base portion widens in a direction of a concavity of the meniscus if the liquid is a wetting liquid, or the cross section of the base portion narrows in the direction of the concavity of the meniscus when the liquid is

not wetting liquid," as recited in claim 40 is indefinite. The Patent Office alleges that the shape of a meniscus in a capillary valve depends on both the fluid and the interior surface of the capillary.

Claim 40 is definite. The Patent Office's reasoning that the shape of the meniscus may depend on the fluid and the interior surface of the capillary is irrelevant to what is being claimed. Claim 40 claims that (1) a cross section of the base portion widens in a direction of a concavity of the meniscus if the liquid is a wetting liquid and (2) the cross section of the base portion narrows in the direction of the concavity of the meniscus when the liquid is not wetting liquid.

Regardless of other possibilities that may exist (i.e., a cross section of the base portion widening in a direction of concavity of the meniscus if the liquid is not a wetting liquid), such are not being claimed, and thus the claim is definite. Applicants need not claim each and every possible embodiment.

Claim 40 is definite.

Claim 41

The Patent Office alleges that claim 41 is indefinite because "based on the plain meaning of the term 'position' and assuming that the chambers are not intended to be moved relative to other structural components, it is unclear whether or not the recitation means that each chamber must include a valve."

Claim 41 does not preclude the use of a valve or that the chambers are moved. As shown in Figs. 2 and 3 of the specification, the isolation chambers are possible of being moved/rotated to be in an open and closed position.

The claim further recites "comprising," so if a valve were to be included, it would thus be within the scope of the claim.

Claim 41 is definite.

Claim 42

The Patent Office alleges that the phrase "another valve with no moving parts" is confusing. The Patent Office suggests amending the claim to recite "a third valve with no moving parts" and "a fourth valve with no moving parts."

Claim 42 is amended in accordance with the Patent Office's suggestion and is definite.

Claim 44

The Patent Office alleges that it is not clear whether "the capillary valves recited in lines 1 and 4 [of claim 44], are the same as the first and second valves recited in claim 37 and/or the same as the two 'another valves' recited in claim 42."

Claim 44 is amended to recite: "...the first valve with no moving parts is disposed between the first connecting channel and the one of the two gas trapping chambers that communicates with the inlet duct, and the second valve with no moving parts is disposed between the second connecting channel and the other of the two gas trapping chambers..." and is definite.

Claims 38, 43 And 45-50

No separate rejection of claims 38, 43 and 45-50 was made by the Patent Office. Applicants thus understand claims 38, 43 and 45-50 were rejected under 35 U.S.C. §112, second paragraph, for depending upon a rejected base claim.

Because the rejections of claims 37, 39-42 and 44 are overcome for at least the above reasons, the rejections of claims 38, 43 and 45-50 are also overcome.

Conclusion

In view of the above, claims 37-50 are definite. Withdrawal of the rejection is respectfully requested.

35 U.S.C. §§102(a) And (e) Rejections

Claims 37-50 were rejected under 35 U.S.C. §§102(a) and (e) as allegedly being anticipated by Mian (U.S. Patent Application Publication No. 2001/0055812). Applicants respectfully traverse this rejection.

Claim 37 requires, among other features, (1) a heat exchange device that exchanges heat with one and/or the other gas trapping chamber to control a pressure of a gas in one and/or the other gas trapping chamber, wherein (2) the pressure of the gas in the one and/or the other gas trapping chamber controls the flow of a liquid in the device.

Mian does not anticipate at least above features (1) and (2) recited in claim 37.

Regarding above feature (1), Mian does not describe any relationship between the temperature control elements and any gas trapping chambers. Mian merely describes that a temperature control element can be fabricated onto the disk. Mian describes that the temperature of any particular area on the disk can be monitored. See paragraph [0150] of Mian.

The mere description that a temperature control element can be included in the device of Mian does not anticipate the heat exchange device that exchanges heat with one and/or the other gas trapping chamber to control a pressure of a gas in one and/or the other gas trapping chamber of claim 37.

Regarding above feature (2), Mian describes that the disk is rotated within the device to impart centripetal force to effect fluid flow on the disk. See paragraph [0099] of Mian. Mian describes that the amount of reagent delivered to a reaction chamber is controlled by the speed of rotation and time during which the valve to the reagent is open. See paragraph [0102] of Mian. Mian does not describe that the pressure of the gas in the one and/or the other gas trapping chamber controls the flow of a liquid in the device, as recited in claim 37.

Mian thus does not anticipate claim 37.

Claims 38-50 depend from claim 37. For at least their respective dependency, and for the additional features recited, Mian also does not anticipate claims 38-50.

Withdrawal of the rejections is respectfully requested.

New Claim

New claim 51 depends from claim 37 and further requires that the device is configured to retain a gas in the two gas trapping chambers when the two gas trapping chambers are at a filling temperature and the device is configured to isolate the operative cavity such that a leakage of the liquid and/or a diffusion of particles contained in the liquid to the inlet duct and the outlet duct is prevented when the two gas trapping chambers are at an isolating temperature that is greater than the filling temperature.

Mian further does not describe these features of claim 51.

Concluding Remarks

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 37-51 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



William P. Berridge
Registration No. 30,024

Andrew B. Whitehead
Registration No. 61,989

WPB:ABW/abw

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OLIFF & BERRIDGE, PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

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